

## General

### Title

Hospital standardized mortality ratio (HSMR): the ratio of the actual number of in-hospital deaths in a region or hospital to the number that would have been expected based on the types of patients a region or hospital treats.

### Source(s)

Canadian Institute for Health Information (CIHI). Technical notes: Hospital standardized mortality ratio (HSMR). Ottawa (ON): Canadian Institute for Health Information (CIHI); 2011 Feb. 17 p.

## Measure Domain

### Primary Measure Domain

Outcome

The validity of measures depends on how they are built. By examining the key building blocks of a measure, you can assess its validity for your purpose. For more information, visit the [Measure Validity](#) page.

### Secondary Measure Domain

Does not apply to this measure

## Brief Abstract

### Description

This measure is used to assess the ratio of the actual number of in-hospital deaths in a region or hospital to the number that would have been expected based on the types of patients a region or hospital treats.

### Rationale

The hospital standardized mortality ratio (HSMR) is an example of a "big dot"\* measure that has been used internationally to help support efforts to improve quality of care in hospitals. The HSMR is a tool that allows hospitals to review and analyze their mortality rates, and then develop targeted strategies

aimed at reducing mortality in identified areas. HSMR has been used in conjunction with other quality of care and patient safety measures.

\*"Big dot" measures track progress on broad outcomes at a system level.

## Primary Clinical Component

Hospital standardized mortality ratio (HSMR); in-hospital mortality; observed to expected deaths

## Denominator Description

Expected\* number of deaths among the 65 diagnosis groups accounting for about 80% of inpatient mortality (see the related "Denominator Inclusions/Exclusions" field)

\*The number of deaths that would have occurred in a hospital or region, had the mortality of these patients been the same as the mortality of similar patients across the country, based on reference year (2004-2005).

## Numerator Description

Actual number of deaths among the 65 diagnosis groups accounting for about 80% of inpatient mortality multiplied by 100

Note: Refer to the original measure documentation for additional detail.

## Evidence Supporting the Measure

### Evidence Supporting the Criterion of Quality

A formal consensus procedure involving experts in relevant clinical, methodological, and organizational sciences

## Evidence Supporting Need for the Measure

### Need for the Measure

Use of this measure to improve performance

### Evidence Supporting Need for the Measure

Canadian Institute for Health Information (CIHI). HSMR: a new approach for measuring hospital mortality trends in Canada. Ottawa (ON): Canadian Institute for Health Information (CIHI); 2007. 100 p. [74 references]

## State of Use of the Measure

### State of Use

Current routine use

## Current Use

Collaborative inter-organizational quality improvement

Internal quality improvement

Monitoring and planning

National reporting

State health policymaking

## Application of Measure in its Current Use

### Care Setting

Hospitals

### Professionals Responsible for Health Care

Measure is not provider specific

### Lowest Level of Health Care Delivery Addressed

Single Health Care Delivery Organizations

### Target Population Age

Ages 29 days to 120 years

### Target Population Gender

Either male or female

### Stratification by Vulnerable Populations

Unspecified

## Characteristics of the Primary Clinical Component

### Incidence/Prevalence

In Canada, between April 2004 and March 2007, just over 254,000 patients died in hospitals outside of Quebec. In 2004-2005, 65 diagnosis groups accounted for about 80% of deaths among patients who did not receive palliative care. The 10 with the most deaths were acute myocardial infarction, heart failure, pneumonia, chronic obstructive pulmonary disease, septicemia, malignant neoplasm of bronchus and lung, stroke (not specified as hemorrhagic or infarction), cerebral infarction, respiratory failure and hip fracture. These groups represented 44% of all in-hospital deaths in 2004-2005. Trends in mortality vary by patient group. For example, death rates for patients with heart attacks fell faster than those for patients with

pneumonia over the study period (2004-2005 to 2006-2007). In contrast, mortality rates stayed constant or rose for other patient groups, such as those with chronic obstructive pulmonary disease and septicemia.

## Evidence for Incidence/Prevalence

Canadian Institute for Health Information (CIHI). HSMR: a new approach for measuring hospital mortality trends in Canada. Ottawa (ON): Canadian Institute for Health Information (CIHI); 2007. 100 p. [74 references]

## Association with Vulnerable Populations

Unspecified

## Burden of Illness

Unspecified

## Utilization

Unspecified

## Costs

Unspecified

## Institute of Medicine (IOM) Healthcare Quality Report Categories

### IOM Care Need

Getting Better

### IOM Domain

Effectiveness

## Data Collection for the Measure

### Case Finding

Users of care only

### Description of Case Finding

All patients treated in an acute care hospital

# Denominator Sampling Frame

Organizationally defined

## Denominator Inclusions/Exclusions

### Inclusions

Expected\* number of deaths among the 65 diagnosis groups accounting for about 80% of inpatient mortality

Discharge between April 1 of a given year and March 31 of the following year

Admission to an acute care institution

Discharge with diagnosis group of interest (that is, one of the diagnosis groups that account for about 80% of in-hospital deaths)

Age at admission between 0 and 120 years

Sex recorded as male or female

Length of stay of up to 365 consecutive days

Admission category is elective (L) or emergent/urgent (U)

Canadian resident (see Appendix II in the original measure documentation for information on identifying non-residents)

\*The number of deaths that would have occurred in a hospital or region, had the mortality of these patients been the same as the mortality of similar patients across the country, based on reference year (2004-2005).

Note: Refer to the original measure documentation for calculation of expected deaths.

### Exclusions

Cadavers, with discharge disposition = 08

Stillborns, with discharge disposition = 09

Sign-outs (that is, discharged against medical advice), with discharge disposition = 06

Patients who do not return from a pass, with discharge disposition = 12

Neonates, with age at admission less than or equal to 28 days

Records with brain death as most responsible diagnosis code (ICD-10-CA): G93.81

Records with palliative care as most responsible diagnosis code (ICD-10-CA): Z51.5

## Relationship of Denominator to Numerator

All cases in the denominator are equally eligible to appear in the numerator

## Denominator (Index) Event

Clinical Condition

Institutionalization

## Denominator Time Window

Time window brackets index event

## Numerator Inclusions/Exclusions

### Inclusions

Actual number of deaths among the 65 diagnosis groups accounting for about 80% of inpatient mortality multiplied by 100

Note: Refer to the original measure documentation for additional detail.

Exclusions

Unspecified

## Measure Results Under Control of Health Care Professionals, Organizations and/or Policymakers

The measure results are somewhat or substantially under the control of the health care professionals, organizations and/or policymakers to whom the measure applies.

## Numerator Time Window

Institutionalization

## Data Source

Administrative data

## Level of Determination of Quality

Not Individual Case

## Outcome Type

Adverse Outcome

## Pre-existing Instrument Used

Unspecified

## Computation of the Measure

## Scoring

Ratio

## Interpretation of Score

Better quality is associated with a lower score

## Allowance for Patient Factors

Risk adjustment devised specifically for this measure/condition

## Description of Allowance for Patient Factors

The hospital standardized morality ratio (HSMR) logistic regression model is fitted with age, sex, length-of-stay (LOS) group, admission category, diagnosis group, comorbidity group and transfers as independent variables and is based on data from all acute hospitals in Canada (excluding Quebec). Coefficients derived from a logistic regression model are used to calculate the probability of in-hospital death. The expected number of deaths for a hospital, corporation or region is based on the sum of the probabilities of in-hospital death for eligible discharges from that organization. The 95% confidence interval is calculated using Byar's approximation.

## Standard of Comparison

Internal time comparison

## Evaluation of Measure Properties

### Extent of Measure Testing

Unspecified

## Identifying Information

### Original Title

Hospital standardized mortality ratio (HSMR).

### Submitter

Canadian Institute for Health Information - Nonprofit Organization

### Developer

Canadian Institute for Health Information - Nonprofit Organization

### Funding Source(s)

Unspecified

### Composition of the Group that Developed the Measure

Unspecified

### Financial Disclosures/Other Potential Conflicts of Interest

Unspecified

### Adaptation

The measure was initially developed in the United Kingdom in mid-1990s by Sir Brian Jarman of Imperial

College. It has been adapted by the Canadian Institute for Health Information (CIHI) to be used in Canadian context.

## Parent Measure

Hospital standardized mortality ratio (HSMR) (Sir Brian Jarman, Imperial College, United Kingdom)

## Release Date

2007 Nov

## Revision Date

2011 Feb

## Measure Status

This is the current release of the measure.

## Source(s)

Canadian Institute for Health Information (CIHI). Technical notes: Hospital standardized mortality ratio (HSMR). Ottawa (ON): Canadian Institute for Health Information (CIHI); 2011 Feb. 17 p.

## Measure Availability

The individual measure, "Hospital Standardized Mortality Ratio (HSMR)," is published in "Technical Notes: Hospital Standardized Mortality Ratio (HSMR)." This document is available in Portable Document Format (PDF) from the [Canadian Institute for Health Information \(CIHI\) Web site](#) .

For more information, contact CIHI at, 4110 Yonge Street, Suite 300, Toronto, Ontario, Canada, M2P 2B7; Phone: 416-481-2002; Fax: 416-481-2950; E-mail: [hsmr@cihi.ca](mailto:hsmr@cihi.ca); Web site: <http://secure.cihi.ca/cihiweb/> .

## Companion Documents

The following is available:

Canadian Institute for Health Information (CIHI). HSMR: a new approach for measuring hospital mortality trends in Canada. Ottawa (ON): Canadian Institute for Health Information (CIHI); 2007. 100 p. This document is available in Portable Document Format (PDF) from the [Canadian Institute for Health Information \(CIHI\) Web site](#) .

## NQMC Status

This NQMC summary was completed by ECRI Institute on April 12, 2011. The information was verified by the measure developer on May 4, 2011.

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